



BT137-600

4Q Triac

12 June 2014

Product data sheet

1. General description

Planar passivated four quadrant triac in a SOT78 plastic package intended for use in general purpose bidirectional switching and phase control applications.

2. Features and benefits

- High blocking voltage capability
- Less sensitive gate for improved noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in all four quadrants

3. Applications

- General purpose motor controls
- General purpose switching

4. Quick reference data

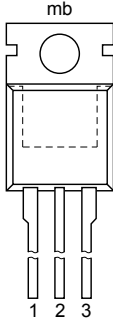

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{J}(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	65	A
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 102\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	8	A
Static characteristics						
I_{GT}	gate trigger current	$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T2+ G+; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; Fig. 7	-	5	35	mA
		$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T2+ G-; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; Fig. 7	-	8	35	mA
		$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T2- G-; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; Fig. 7	-	11	35	mA
		$V_{\text{D}} = 12\text{ V}$; $I_{\text{T}} = 0.1\text{ A}$; T2- G+; $T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; Fig. 7	-	30	70	mA



5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 <p>TO-220AB (SOT78)</p>	 <p>sym051</p>
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT137-600	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
BT137-600/DG/L01	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
BT137-600/L01	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	65	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$; Fig. 4 ; Fig. 5	-	71	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	21	A ² s
di_T/dt	rate of rise of on-state current	$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2+ G+	-	50	A/ μs
		$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2+ G-	-	50	A/ μs
		$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2- G-	-	50	A/ μs
		$I_T = 12\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$; T2- G+	-	10	A/ μs
I_{GM}	peak gate current		-	2	A
P_{GM}	peak gate power		-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.5	W
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	125	°C

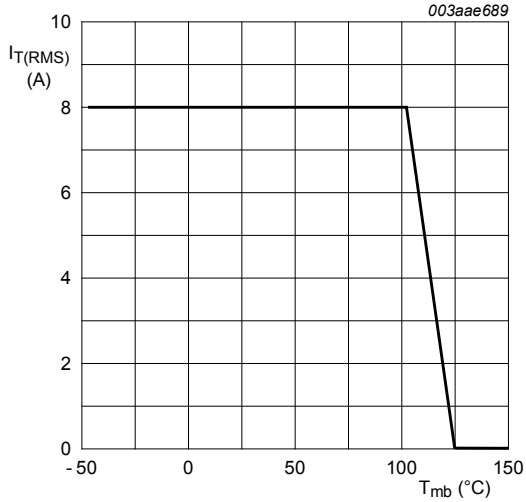
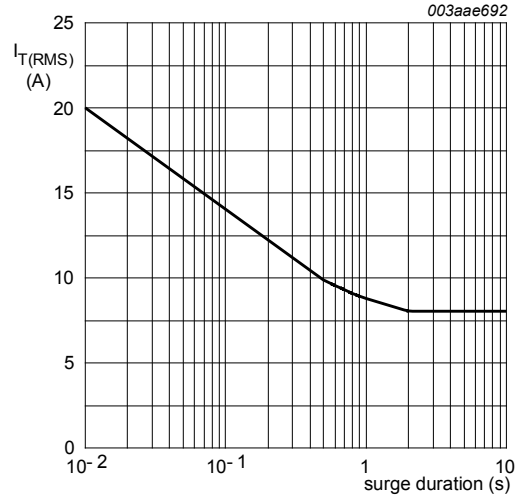
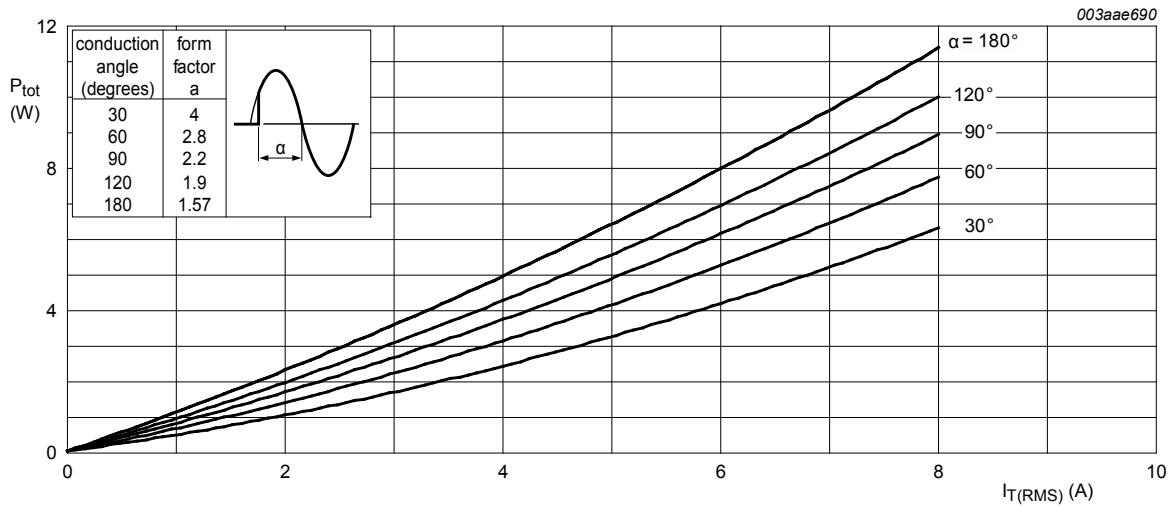


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz
 $T_{mb} \leq 102\text{ }^{\circ}\text{C}$

Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle
 a = form factor = $I_{T(RMS)}/I_{T(AV)}$

Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

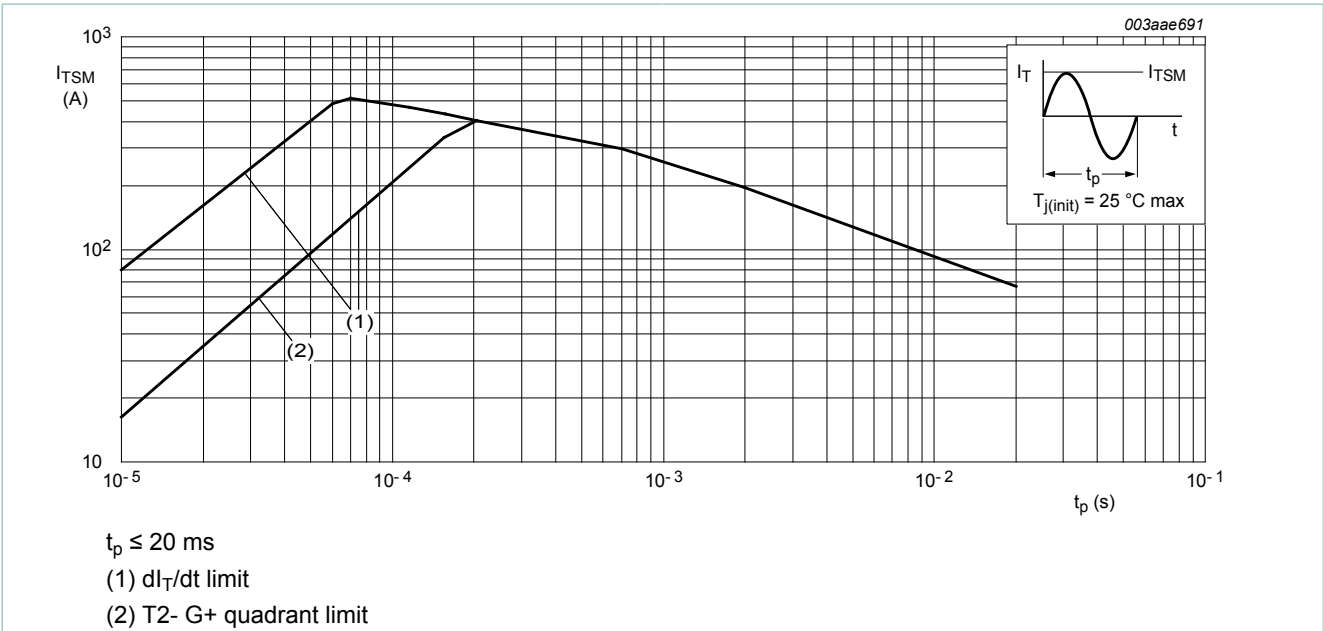


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

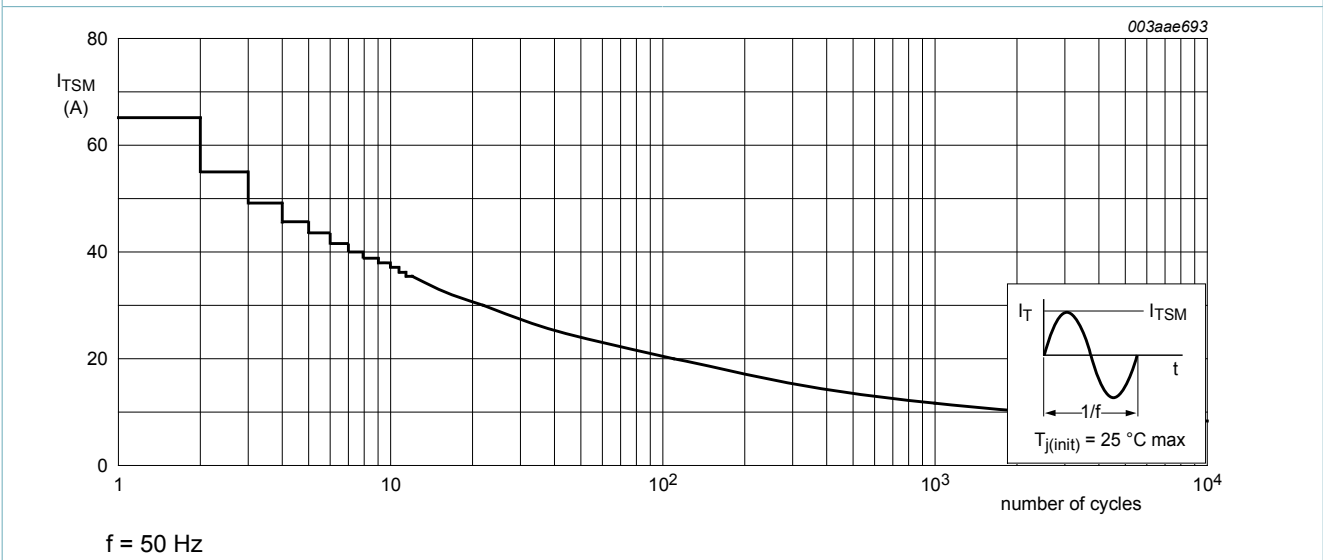


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	half cycle; Fig. 6	-	-	2.4	K/W
		full cycle; Fig. 6	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

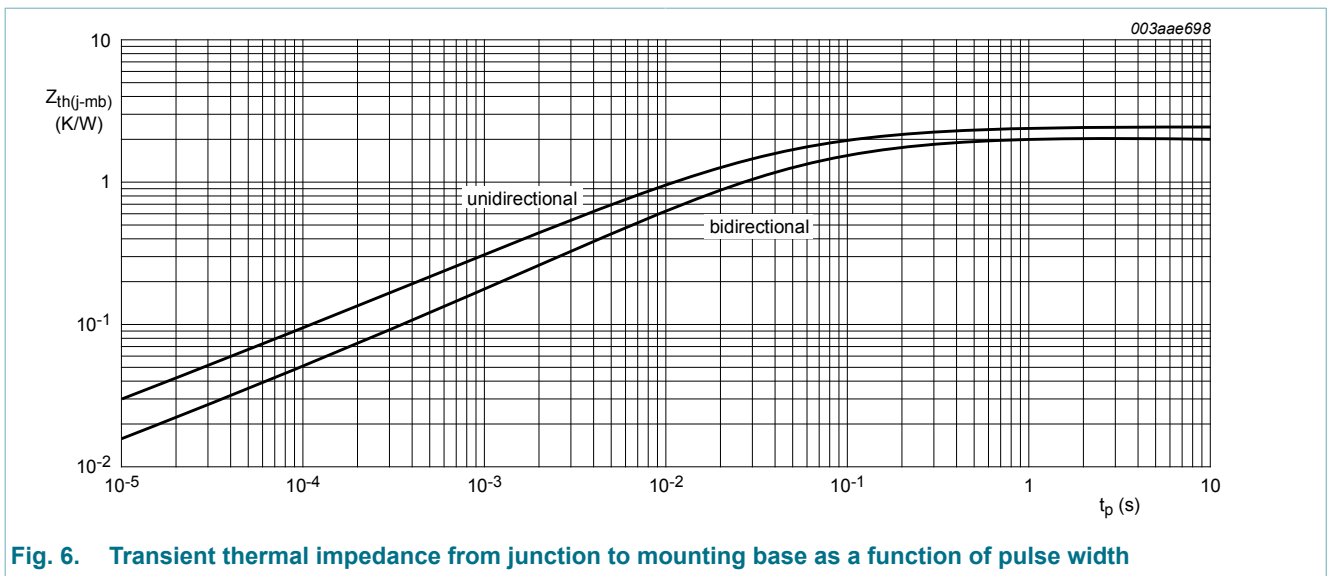


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	5	35	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	8	35	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	11	35	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T2- G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	30	70	mA
I_L	latching current	$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	7	30	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	16	45	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	5	30	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T2- G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	7	45	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9	-	5	20	mA
V_T	on-state voltage	$I_T = 10\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10	-	1.3	1.65	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 11	-	0.7	1	V
		$V_D = 400\text{ V}; I_T = 0.1\text{ A}; T_j = 125\text{ }^\circ\text{C};$ Fig. 11	0.25	0.4	-	V
I_D	off-state current	$V_D = 600\text{ V}; T_j = 125\text{ }^\circ\text{C}$	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of $V_{DRM});$ exponential waveform; gate open circuit	100	250	-	V/ μ s
dV_{com}/dt	rate of change of commutating voltage	$V_D = 400\text{ V}; T_j = 95\text{ }^\circ\text{C}; dI_{com}/dt = 3.6\text{ A/}$ ms; $I_T = 8\text{ A};$ gate open circuit	-	20	-	V/ μ s
t_{gt}	gate-controlled turn-on time	$I_{TM} = 12\text{ A}; V_D = 600\text{ V}; I_G = 0.1\text{ A}; dI_G/$ dt = 5 A/ μ s	-	2	-	μ s

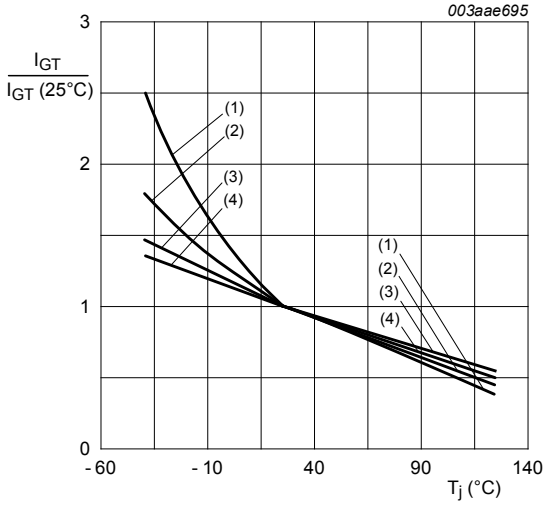


Fig. 7. Normalized gate trigger current as a function of junction temperature

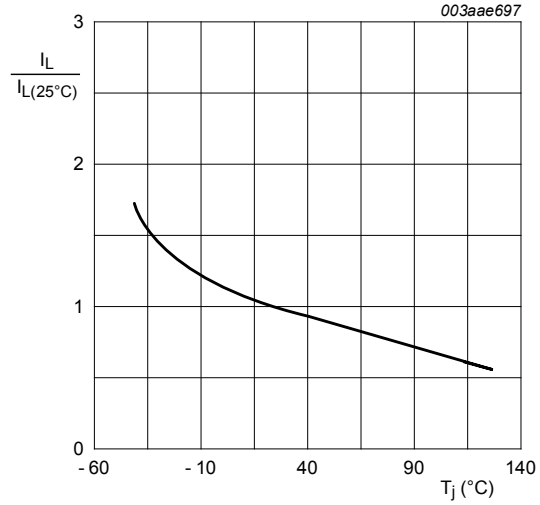


Fig. 8. Normalized latching current as a function of junction temperature

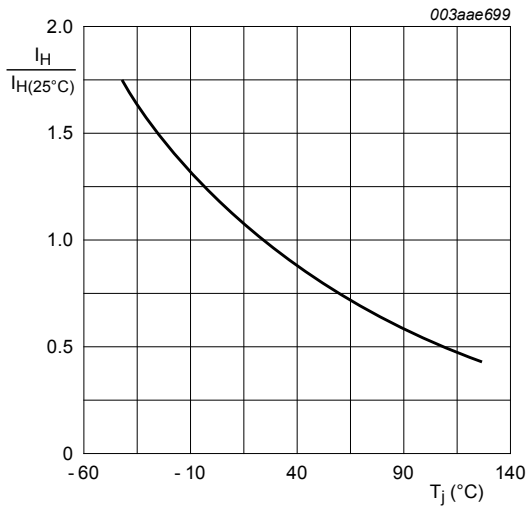
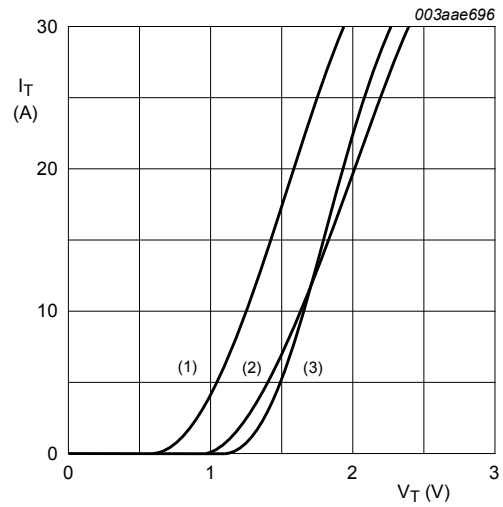


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.264 \text{ V}$

$R_s = 0.038 \Omega$

(1) $T_j = 125^{\circ}\text{C}$; typical values

(2) $T_j = 125^{\circ}\text{C}$; maximum values

(3) $T_j = 25^{\circ}\text{C}$; maximum values

Fig. 10. On-state current as a function of on-state voltage

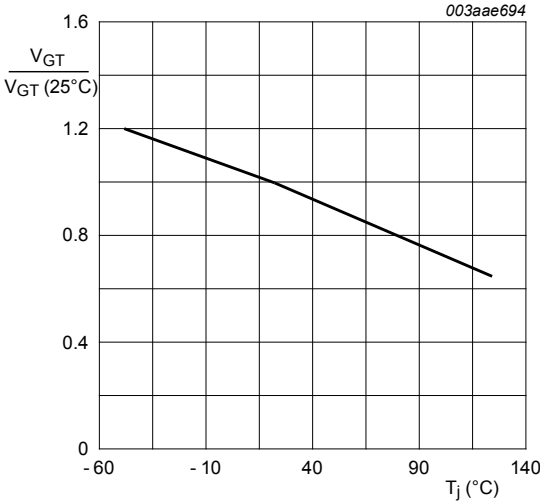


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b	b ₁ (2)	b ₂ (2)	c	D	D ₁	E	e	L	L ₁ (1)	L ₂ (1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

- 1. Lead shoulder designs may vary.
- 2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT78		3-lead TO-220AB	SC-46		08-04-23 08-06-13

Fig. 12. Package outline TO-220AB (SOT78)

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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